peated applications of copper sulphate, which might not be necessary in dealing with species of *Helisoma*.

In the experiment which resulted in the implication of *P. columella* as an intermediate host of *F. hepatica*, the third generation of laboratory-raised snails was used. All stock snails of this species have been kept in evaporating dishes in filtered water and fed on fresh lettuce. Twenty-three snails used in the experiment were hatched about December 8, 1932, and were transferred to a stender dish on December 25, 1932, when they were half grown. Several hundred miracidia were taken out of a container in which *F. hepatica* eggs were hatching, and transferred to the stender dish containing the snails. The 23 snails were left in the stender dish with the miracidia for about 4 hours and were then transferred to a fingerbowl of filtered water. Microscope observations previously made on this species of snail in the presence of miracidia, showed that the miracidia attached to and penetrated into the snail.

Two of the 23 snails in the experiment were dissected and examined for rediae January 11, 1933, and, apparently, were negative. Another snail was dissected January 24, 1933, and 8 mother rediae containing developing daughter rediae were recovered. The first of the 20 remaining snails shed cercariae on February 10, 1933, 47 days after being subjected to infection, and 17 of the remaining infected snails were shedding cercariae after 8 more days had elapsed. The 2 remaining snails were negative. The largest number of cercariae shed by a snail in a single day was 161. One snail which had been shedding cercariae for 2 days was examined and the liver contained 241 rediae and 356 mature cercariae. The results in the above infection experiment have been verified in subsequent experiments by the writer.

## ZOOLOGY.—*Descriptions of two new parasitic nematodes from birds.*[1]

EVERETT E. WEHR, Bureau of Animal Industry. (Communicated by BENJAMIN SCHWARTZ.)

The first parasite described in this paper was collected by E. A. Chapin from the gizzard of a whistling swan, *Cygnus columbianus*, which died May 5, 1924 at the National Zoological Park, Washington, D. C. This nematode belongs to the family Amidostomidae Baylis and Daubney, 1926, subfamily Amodostominae Travassos, 1920, genus *Amidostomum* Railliet and Henry, 1909. Since the species in

[1] Received April 22, 1933.

question possesses certain characters which differ from those of any of the described species of the genus, it is considered, in this paper, as a new species.

**Amidostomum cygni**, n. sp.

*Diagnosis.*—Body very slender. Cuticle with fine transverse striations. Head slightly constricted at base of lips. Lateral alae absent. Oral opening circular, surrounded by four pairs of submedian cephalic papillae and one pair of amphids (Fig. 3). Buccal cavity with relatively thin walls; three triangular teeth at base of buccal cavity; one tooth large, with a broad base and a curved tip, and two remaining teeth smaller, about equal in size, with pointed tips. Anterior end of esophagus slightly swollen (Fig. 4).

*Male* 12 to 13 mm. long by 177$\mu$ in maximum width. Esophagus 1.16 mm. long, slightly dilated at its anterior end. Nerve ring about 309$\mu$ from anterior extremity. Prebursal papillae present. Bursa with lateral lobes only slightly longer than the dorsal lobe (Fig. 5). Externo-lateral ray thick, bent near its tip in an anterior direction, so that it does not reach edge of the bursa (Fig. 5). Postero-lateral and medio-lateral rays united for about one-half or more of their lengths, both rays reaching edge of bursa. Externo-dorsal ray shorter than dorsal ray, and arising from the same stem. Dorsal ray about 70$\mu$ long, bifurcated terminally, and extending to tip of dorsal lobe, terminal branches bidigitate. Spicules equal, about 170$\mu$ long, similar in shape to those of other species of genus (Fig. 5). Gubernaculum slender, about half the length of spicules (Fig. 5).

*Female* 16 to 17 mm. long by 188$\mu$ in maximum width. Esophagus 1.22 mm. long. Vulva about 3.5 mm. from posterior end of body. Tail about 2.85 mm. long, abruptly narrowed posterior to anal opening, its posterior extremity rounded. Eggs oval, 58 to 62$\mu$ long by 35$\mu$ wide.

*Host.*—Whistling swan, *Cygnus columbianus.*

*Location.*—Underneath tunic lining of gizzard.

*Locality.*—National Zoological Park, Washington, D. C.

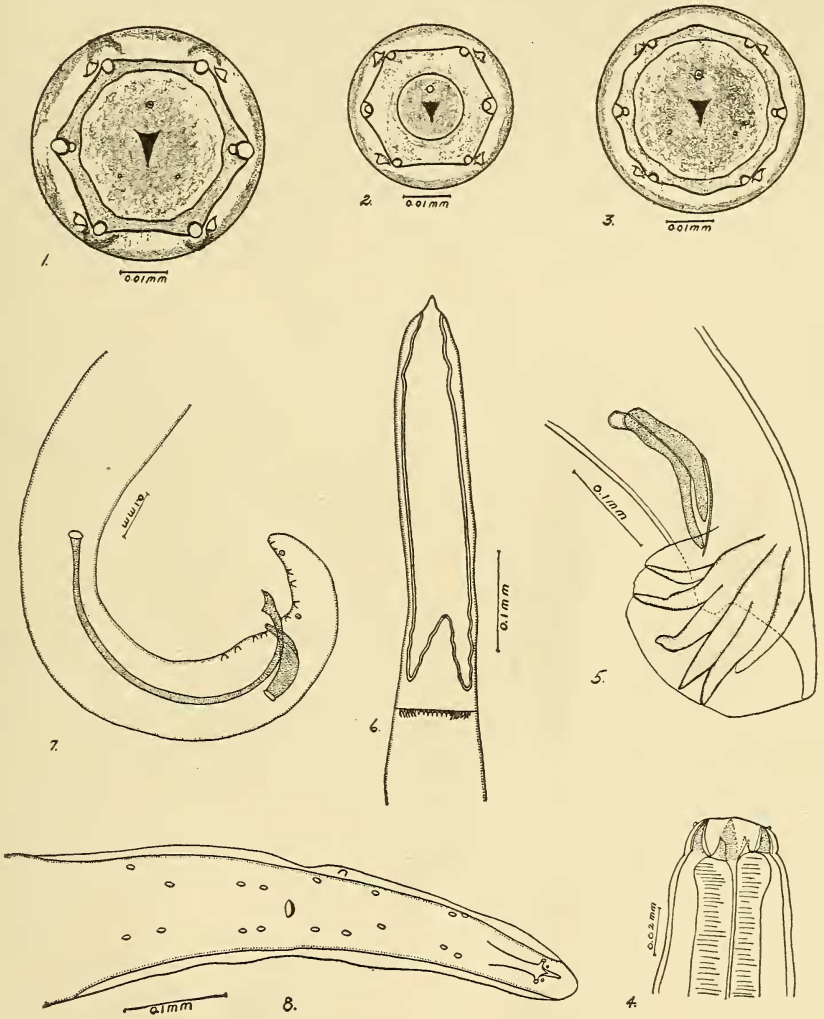
*Type specimens* (male and female).—U. S. N. M., Helminthological Collection, No. 26142.

*Paratypes.*—U. S. N. M. Helminthological Collection, No. 26142.

Inclusive of the species described in this paper, the genus *Amidostomum* now contains 10 species. Baylis[2] considered *A. fuligulae* Maplestone, 1930 and *A. anatinum* Sugimoto, 1930 synonyms of *A. skrjabini* Boulenger, 1926. So far as can be judged from available descriptions of these 3 species, this view appears sound. Cram[3] stated that *A. skrjabini* was possibly a synonym of *A. chevreuxi* Seurat, 1918, but, according to Baylis,[2] this synonymy should not be established until a study of the type material of *A. chevreuxi* has been made, or until specimens from the type host, *Himantopus himantopus,* have been examined for comparison with Baylis's redescription of the type specimens of *A. skrjabini. Amidostomum leucopariae* Solonitsyn 1928 must be

[2] Baylis, H. A. *A comparison of certain species of the nematode genus* Amidostomum, *with a description of a new species.* Ann. and Mag. Nat. Hist., ser.10, 10 (57): 281–287. 1932.

[3] Cram, E. B. *Bird parasites of the nematode suborders Strongylata, Ascaridata, and Spirurata.* U. S. Nat. Mus. Bull. 140. 1927.




Figures 1–8. 1. *Amidostomum spatulatum*, anterior end (*en face* view); 2. *Amidostomum chevreuxi*, anterior end (*en face* view); 3. *Amidostomum cygni*, anterior end (*en face* view); 4. *Amidostomum cygni*, anterior end of female (lateral view); 5. *Amidostomum cygni*, posterior end of male (lateral view); 6. *Pectinospirura argentata*, anterior extremity of male (lateral view); 7. *Pectinospirura argentata*, posterior end of male (lateral view); 8. *Pectinospirura argentata*, posterior end of male (ventral view).

considered a *nomen nudum*, as no description accompanied this name.

Except for the species *A. acutum* (Lundahl, 1848) Seurat, 1918, and *A. fulicae* (Rudolphi, 1819) Seurat, 1919, which have been imperfectly described, the species of the genus *Amidostomum* may be divided into two distinct groups, based on the number of teeth present in the buccal cavity, namely, (1) those species possessing one tooth and, (2) those with three teeth. *Amidostomum monodon* (Linstow, 1882) Skrjabin, 1915, *A. chevreuxi*, and *A. skrjabini* fall into the first group, while *A. anseris* (Zeder 1800) Railliet and Henry, 1909, *A. henryi* Skrjabi, 1915, *A. spatulatum* Baylis, 1932, *A. raillieti* Skrjabi, 1915, and the species described in this paper, *Amidostomum cygni*, belong to the second group.

The species of the genus *Amidostomum* may be readily identified with the aid of the following key:

KEY TO THE WELL DESCRIBED SPECIES OF AMIDOSTOMUM[4]

1. Without teeth in buccal cavity ..... 2
   With teeth in buccal cavity ..... 3
2. Male 8.58 mm., female 9 mm. long; vulva 1.56 mm. from posterior extremity; spicules 175μ long ..... *A. fulicae*
   Male 10 to 14 mm., female 14 to 17 mm. long; vulva 2.8 to 3.1 mm. from posterior extremity; spicules not described ..... *A. acutum*
3. Buccal cavity with single tooth at base ..... *A. chevreuxi*
   Buccal cavity with three teeth at base ..... 4
4. Externo-dorsal rays arise in common with dorsal ray; lateral lobes of bursa only slightly longer than dorsal lobe ..... 5
   Externo-dorsal rays do not arise in common with dorsal ray, but originate near the base of the common stem from which all rays in the lateral lobes arise; lateral lobes of bursa much longer than dorsal lobe .... 6
5. Ventral process of each spicule ends in a large, laterally flattened expansion; cuticle of anterior end of head noticeably swollen about each of the submedian papillae ..... *A. spatulatum*
   Ventral process of each spicule does not end in a large, laterally flattened expansion; cuticle of anterior end of head not noticeably swollen about each of the submedian papillae ..... *A. cygni* n. sp.
6. Buccal cavity 15 to 18.5μ wide; male 8 mm., female 14.5 mm. long; spicules 166μ long ..... *A. henryi*
   Buccal cavity 27.5μ or more wide; spicules 200 to 300μ long ..... 7
7. Male 5.5 to 7.9 mm., female 6.8 to 9.3 mm. long; vulva 1.3 to 1.8 mm. from posterior end of body ..... *A. raillieti*
   Male 10 to 17 mm., female 12 to 24 mm. long; vulva 2.4 to 4.8 mm. from posterior end of the body ..... *A. anseris*

The species described below represents a new genus as well as a new species; it was collected from the proventriculus of a herring gull, *Larus argentatus smithsonianus*, on September 3, 1931, at Vineland,

[4] *A. monodon* and *A. skrjabini* have not been included in the following key. *A. monodon* has been rather inadequately described, and *A. skrjabini*, so far as its morphology is known, lacks morphological character which can be used to separate it from *A. chevreuxi*.

New Jersey, by J. J. Black, and from ulcers of the proventriculus of a laughing gull, *Larus atricilla* (=*Chroicocephalus atricilla*), on June 11, 1926, at Washington, D. C., by E. B. Cram. The presence of cordons readily identifies these specimens as belonging to the family Acuariidae Seurat, 1913, subfamily Acuariinae Railliet, Henry and Sisoff, 1912. The structure of the cervical papillae, which are located at the base of the cordons, does not permit the allocation of these forms to any of the existing genera in that subfamily. Each cervical papilla consists of a transverse row of about 20 posteriorly directed spines; this very unique feature differentiates the new genus from the closely related genus *Synhimantus*, in which the cervical papillae are tricuspid.

**Pectinospirura**, n. g.

*Diagnosis.*—Oral opening dorso-ventrally elongate, surrounded by two large lateral pseudolabia, each of which bears two submedian cephalic papillae and one large amphid. Cordons recurrent, anastomosing, and extending, in type species, a short distance beyond first division of esophagus. Esophagus composed of two parts. Spicules unequal in size and dissimilar in structure.

*Type species.*—*Pectinospirura argentata*, n. sp.

*Specific diagnosis.*—Cordons extend to a level slightly posterior to junction of anterior (muscular) and posterior (glandular) portions of esophagus; cordons anastomose shortly after turning anteriorly (Fig. 6). Each cervical papilla consists of a transverse row of approximately 20 posteriorly directed spines; outer spines curved slightly inwards and larger than the others (Fig. 6). These cervical papillae are probably homologous with the cervical papillae of *Synhimantus*, *Streptocara* and other genera of the subfamily Acuariinae possessing such characters.

*Male* 6 to 6.5 mm. long by 267$\mu$ wide. Buccal cavity narrow, 285 to 310$\mu$ long. Anterior portion of esophagus 560 to 570$\mu$ long, posterior portion 2.75 to 3 mm. long. Nerve ring 392$\mu$ from anterior extremity. Cordons extend posteriorly for about 1 mm., or about 1/5 of total length of body; at this level they turn anteriad and anastomose about 125.6$\mu$ from point of turning. Tail rounded, 283$\mu$ long. Four pairs of preanal and seven pairs of postanal papillae present (Fig. 8). Spicules unequal, long spicule about 816$\mu$ long, slender and terminating in a hook-like tip; short spicule about 188$\mu$ long, stout, and ending in a rounded tip (Fig. 7).

*Female* 6.5 to 7.0 mm. long by 314$\mu$ wide. Buccal cavity 309$\mu$ long and narrow. Anterior portion of esophagus 556$\mu$ long, posterior portion 3.1 mm. long. Nerve ring 417$\mu$ from anterior extremity. Cordons extend for a distance of about 1.12 mm. along sides of body, from which point they turn anteriad and anastomose at about the same distance from point of turning as in the male. Vulva in posterior half of body, about 1.34 mm. from posterior end. Eggs 44$\mu$ by 28$\mu$.

*Hosts.*—Herring gull, *Larus argentatus smithsonianus*, and Laughing gull, *Larus atricilla*.

*Location.*—Proventriculus.

*Locality.*—Vineland, New Jersey and vicinity of Washington, D. C.

*Type specimens* (male and female).—U. S. N. M., Helminthological Collection, No. 30574.

*Paratypes.*—U. S. N. M., Helminthological Collection, No. 30574.

The genera of the subfamily Acuariinae may be differentiated with aid of the following key:

KEY TO GENERA OF ACUARIINAE

1. Cordons not recurrent and not anastomosing . . . . . 2
   Cordons recurrent or anastomosing, or both . . . . . 3
2. Both spicules thick and only slightly unequal; 6 to 8 pairs of postanal papillae . . . . . *Acuaria*
   Spicules markedly dissimilar in structure and very unequal in size; 5 to 7 pairs of postanal papillae . . . . . *Cheilospirura*
3. Cordons not recurrent, but anastomosing . . . . . 4
   Cordons recurrent, anastomosing or separate . . . . . 6
4. Cuticle raised in front of postcervical papillae to form large collar or sheath, cordons anastomose on free border of collar . . . . *Chevreuxi*
   No such collar or sheath present . . . . . 5
5. Cordons confined to cephalic region; cuticle of head inflated . *Aviculariella*
   Cordons not confined to cephalic region; cuticle of head not inflated . . . . . *Echinuria*
6. Cordons recurrent, but not anastomosing . . . . . *Dispharynx*
   Cordons recurrent and anastomosing . . . . . 7
7. Cordons form loop directly after their origin on head; cordons not flat against body, but applied to margin of plates or alae; lateral alae present on body . . . . . *Cosmocephalus*
   Cordons lacking loops at anterior ends; cordons applied directly to body; no lateral alae . . . . . 8
8. Chitinous structures (cervical papillae) at base of cordons tricuspid in structure . . . . . *Synhimantus*
   Chitinous structures (cervical papillae) at base of cordons each consisting of about 20 posteriorly directed spines . . . . . *Pectinospirura*